

## A PROMISING FUNGOUS PATHOGEN OF ADULT JAPANESE BEETLES (POPILLIA JAPONICA)

The New Jersey Department of Agriculture has actively conducted Japanese beetle suppression work since 1927. During this period opportunity of every description has been available to evaluate the comparative benefits of the weapons of artificial and natural control which are now at our disposal. In a report issued by this Department in 1932, a statement was made that a communicable disease among adults would probably prove to be the most vulnerable channel of Japanese beetle suppression. The control recommendations even as they apply today, consist largely of the use of repellents rather than chemicals which have a destructive effect on the beetle population. The performance of Japanese beetle traps in New Jersey has not been sufficiently convincing to justify the continuation of experimentation on this phase of artificial Japanese beetle suppression.

This Department, in view of its conviction that a communicable disease among adults would make serious inroads in the Japanese beetle population, employed an entomologist for a period of two months during the summer of 1933 and stationed him in the most heavily infested county in the state. His job consisted of examining piles of trapped Japanese beetles, taking samples therefrom and making careful examination of these samples to ascertain the presence of symptoms of bacterial or fungous diseases. These observations did not yield any positive findings. Since 1932 our suppression crews have been instructed to give special attention to the appearance of dead and living adult Japanese beetles with particular reference to the appearance of disease symptoms. To date our field observations have not encountered any such indications of a pathogenic organism being destructive among the adults.

In October, 1939, a list of a local library accessions included a reference to a paper which appeared a few months earlier in the *Canadian Journal of Research*, the title of which was "Pathogenicity of *Beauveria bassiana* (Bals.) Vuill., on Colorado potato

beetle larvæ." The author of this paper, a staff member of the Canadian Department of Agriculture, was the recipient of a letter from this Department requesting a copy of the publication on this subject and also, if possible, a culture of the fungus. Upon the completion of the necessary arrangements with the office of Foreign Plant Quarantines in Washington a permit was procured for the introduction of this culture and it was accordingly sent and received in Trenton November 27, 1939.

According to the individual who supplied this culture this strain of *Beauveria bassiana* is an isolate from cultures made from infected Colorado potato beetle larvæ, discovered in a potato field at Fredericton, New Brunswick, Canada. Its pathogenicity on the larvæ of the Colorado potato beetle has been established.

During December, 1939, and January, 1940, a number of tests were conducted at the White Horse Laboratory of this Department to determine whether or not the Canadian strain of *Beauveria bassiana* was capable of infecting third instar larvæ of the Japanese beetle (*Popillia japonica*). Spores of the fungus were applied dry to some beetle larvæ, while aqueous spore suspensions were applied to other groups of larvæ. A number of beetle larvæ were also confined in tins with soil heavily inoculated with the *Beauveria* spores. The rate of incidence of the fungous disease was very low in these tests, and it was concluded that the fungus probably had little potentiality as a control measure for larvæ of the Japanese beetle.

In July and August, 1940, experimentation was resumed using the adult Japanese beetle, and exposing these to infection by the fungous spores. When the beetles were dusted with the spores a very high rate of infection was obtained, often 100 per cent. Beetles allowed to feed on plant leaves which had been sprayed with a dilute aqueous suspension of the spores were also attacked by the fungus, the rate of infection approximating 75 per cent in a number of tests.

Initially healthy beetles, kept in close association with beetles previously exposed to infection, were found to contract the disease, the rate of incidence varying from 20 to 70 per cent in the initially unexposed beetles.

In a test performed outdoors by spraying food plants of the

beetle with an aqueous spore suspension an indeterminate rate of infection occurred, a number of dead, typically attacked beetles being later found under the sprayed plants. Some beetles removed from the sprayed plants after having been observed to feed, subsequently died of the fungus.

Other beetles, first dusted with the fungous spores, and then placed in outside screened cages began dying in four days, and mortality was practically complete within ten days. Healthy beetles were then introduced into these cages, and later, large numbers of these died, exhibiting the typical external growth of *Beauveria*.

The spores of *Beauveria bassiana* may be produced cheaply and in large quantities upon a variety of culture media. The preliminary tests of infection in adult beetles indicate that the fungus may be a promising new natural control agency for the Japanese beetle.—EDGAR G. REX, New Jersey Department of Agriculture, Trenton, N. J.

### BOOK NOTICE

*Insect Transmission of Plant Diseases.* By Julian Gilbert Leach, Ph.D., Professor of Plant Pathology and Head of the Department of Plant Pathology and Bacteriology, West Virginia University; Formerly Professor of Plant Pathology, University of Minnesota. First edition. 8vo., cloth, 615 pp., 238 illus., McGraw-Hill Publications in the Agricultural Sciences, N. Y., McGraw-Hill Book Co., 1940. \$6.00.

That certain insects have an important part in the spread and development of many plant diseases has become more and more keenly realized during the past two or three decades as constantly increasing evidence has appeared in the literature of plant pathology. Since much of this evidence has been recorded only in widely scattered publications, and has never hitherto been adequately summarized or coordinated, it would appear that there is a definite need for this book. Particularly is this true, since the author has endeavored to bring together in one publication all of the more important contributions in this field of study, and has made special effort to evaluate and interpret the evidence in the light of the more recent advances in entomology and plant pathology. In presenting the material, an effort has been made